GROWTH AND REPRODUCTION OF TWO SPECIES OF SPIDER CRAB (BRACHYURA: MAJIDAE)

Brachyuran crabs, and decapod Crustacea generally, display a great diversity of growth-reproductive patterns (Hartnoll, 1985). The Majidae are more constrained than most other brachyuran groups, as the females are limited to a single mature instar (Hartnoll, 1963, 1985). The processes of growth and reproduction are therefore temporally separate. These species are not, however, fully semelparous as females may lay several egg batches in the terminal instar. This study considers the female life history of two majids, *Hyas coarctatus* and *Inachus dorsettensis*. Reproduction in the field and growth in the laboratory have been studied in relation to the known phenology of their life-cycles. A life history strategy model currently applied to a different species is described also, to which the results of this study are to be applied.

Animals were collected at sites where the two species co-exist in the Irish Sea, 54° N. The offshore water temperature there is at a minimum between February and March and at a maximum between August and September. The two species have contrasting life histories. *H. coarctatus* females start to mature their ovaries in January, prior to the terminal moult which occurs mainly between May and July. Mating and egg laying follows immediately. After 9–11 months, the following March to April, eggs are hatched and the females which survive then lay a second batch. *I. dorsettensis* females mature their ovaries only after the terminal moult, which occurs between July and September. After a short delay for ovarian maturation the first egg batch is laid in autumn. Egg development time is relatively short, allowing a second batch to be laid in early spring. Egg development is not synchronised with the seasons in this species.

Fecundity of the females was assessed using a dry method. In *H. coarctatus* a strong relationship was found between egg number and the cube of carapace length. *I. dorsettensis* had a double fecundity curve. Samples taken in the autumn, when most animals would have been carrying their first batch of eggs, gave a shallow curve. In the spring, when the animals would have been carrying their second or subsequent batch, a significantly steeper curve was obtained. It would appear therefore that fecundity is low for the first batch of eggs, despite the animal delaying ovarian maturation until the final and largest instar.

The growth experiment was performed in the laboratory over 500 days, with the temperature mimicking that of the sea through the seasons. The results, in the form of the percentage moult increment and intermoult period, were analysed in rela-

tion to the size of the animal and the temperature, treating juveniles and animals moulting to maturity separately where appropriate.

In *H. coarctatus* the mean percentage increment was significantly smaller for maturity moult than for juvenile moults. This may be related to the early diversion of resources to reproduction in this species. Percentage increment showed a significant negative correlation with temperature, but only for juvenile moult. Intermoult period was positively related to carapace length and negatively correlated with temperature.

In direct contrast, *I. dorsettensis* had a greater percentage increment at the maturity moult than at its juvenile moults. This may be tentatively interpreted as a strategy for maximum body size in the final instar, in which to develop its ovaries. The maturity moult was undergone at a significantly higher temperature than the juvenile moults, a result which agrees well with the known phenology of this species. Intermoult period was found to be negatively related to temperature but unrelated to carapace length.

These results will be applied to the model of Hartnoll and Gould (1988). At present this model describes the life history of a crab species which continues moulting after puberty. It is aimed to predict how lifetime egg production varies with the precocity of reproduction and lifespan, both measured as the number of instars. A second aim is to observe the change in optimal strategy, with respect to lifetime egg production, when the mortality assumptions are varied. Application of the spider crab data to the model will allow a comparison of predicted optima with the observed natural life history and the investigation of the effect of mortality on life history strategy.

Acknowledgements

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